Soil Conservation

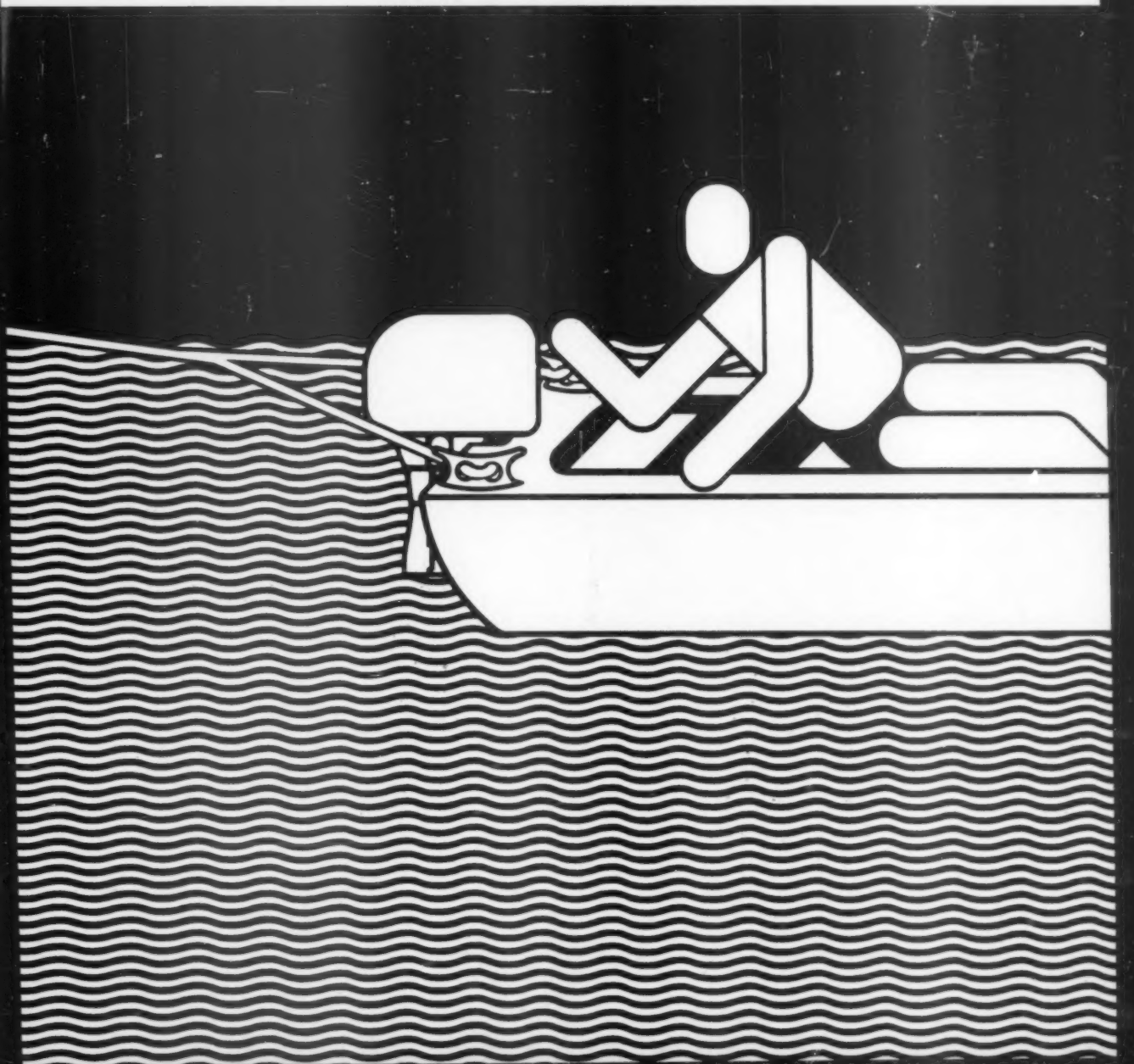
June 1978

U.S. Department of Agriculture

Dynamic Duo for Recreation 6

A Boardwalk for Park Place 8

Having a Field Day 11



From the Administrator

Recreation Within Reach

In the past few years, the demand for recreational opportunities—especially outdoors and within reach of population centers—has grown rapidly and shows no sign of letting up. SCS and conservation districts are helping to meet this growing demand.

For example, many small watershed projects include public facilities for swimming, boating, fishing, picnicking, and camping. Some offer game courts, playgrounds, and trails for hiking, biking, and horseback riding—all in addition to providing flood protection.

Recreation is an important feature of most Resource Conservation and Development areas—complete parks with water for fishing, boating, and swimming; miniparks alongside quiet rivers; or family picnic areas. Recreation adds an economic spark to the community as well as more enjoyment.

Satisfying people's wants for recreation is a worthy land use, just as much as producing crops, forage, or timber. It can be the primary use of certain areas, but it is more likely to be part of a multiple-use scheme for land and water.

Nearly three-fourths of the land in the United States is privately owned. Landowners thus can help supply recreation to meet the needs of a growing population. By blending multiple uses of land and water and applying the right kind of conservation practices, landowners can gain important commercial and personal recreation benefits:

- Farm ponds can provide excellent swimming and fishing.
- Fish farms can include pay lakes for public fishing.
- Wetlands properly preserved and managed attract a wide variety of game and nongame wildlife.
- Streambank stabilization improves fishing by improving water quality.
- Windbreaks, stripcropping, patterned brush control, woodland management, and erosion control plantings furnish food and cover for wildlife and improve water quality.
- Soil and water conservation beautifies the landscape for sports enthusiasts, nature lovers, and front porch rockers alike.

By thinking of multiple use when we help land users plan conservation practices, SCS and districts can offer priceless recreation benefits—at less additional cost.

Mel David

June 1978, Vol. 43, No. 11

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Contents

From the Administrator 2

Pride in a Park Started with Erosion Control 4
Ronald P. Church

Recreation Times Two 6
Silver Lake, A Shining Example, by Myron P. Senechal and Elmer R. Umland
A Dream Come True, by Martin C. Lund

Beauty Among the Tupelos 8
Keith R. Cain

Feedlot Runoff Control 9
Orbin Brandvold

George Townsend, Dust Bowl Veteran 10
Michael M. Price

Clearwater Revival 11
Anne Schuhart

Mahantango Means Watershed Research 14
Harry B. Pionke and Joseph D. Sieck

Soil Survey in Liberia 16
Luther C. Geiger

Controlling Wind Erosion in Nicaragua 18
Gerald M. Darby

Stabilizing a Coal Refuse Pile 20
Sheridan I. Dronen and Charles S. Pendleton

Youth Camps for Conservation 22
Frederick E. Bubb

Meetings 23

A county park in Michigan gets a new look with erosion control measures and improved facilities.

Pride in a Park Started with Erosion Control

As part of an RC&D measure, SCS helped control erosion and improve facilities at the Oscoda County Park on the Au Sable River in Michigan. A timbered stairway was built to replace an eroding footpath, and a rock chute was constructed in the path of concentrated runoff to retard gullying.

SCS provided assistance in planning the community's modern amphitheater situated on a hill overlooking the river. High school band concerts and many other community events are held in the new outdoor theater.

by Ronald P. Church

"Attendance at the Oscoda County Park is above previous years, a natural resource is protected and being used wisely, and Oscoda County's 4,726 residents are now proud of their park," said Barney Kinney, Chairman of the Oscoda Park Commission.

This was not always the case. This beautiful park on the Au Sable River near Mio, Mich., was deteriorating. Campers climbing the high, steep bank along the river were creating gullies, and minimal camping and day-use facilities were overused and rundown. As a result, people were going elsewhere for outdoor recreation.

When the Huron Pines Resource Conservation and Development measure was authorized in 1972, the Oscoda County Park and Recreation Commission submitted a proposal to improve the park and control erosion. The proposal was approved and given a high priority by the county and RC&D councils. The Soil Conservation Service was called in for technical assistance.

Pedestrian traffic to and from the river bared the sloping banks, leaving them vulnerable to erosion.

SCS worked with the Park Commission and the Oscoda County Soil Conservation District (SCD) to solve erosion problems. Plans for controlling erosion on the 54-acre park included:

- Critical area seeding of about 2 acres with a seeding mixture of Kentucky 31 tall fescue, red fescue, perennial rye, and Kentucky bluegrass.
- Recreation walkways which control gully erosion and provide access to the river.
- About 3,400 feet of rail fencing, used to direct people to the protected walkways.
- Two rock chutes constructed in areas of concentrated runoff where vegetation could not control erosion.
- One grassed waterway, 500 feet long.

Money for the materials was provided through the RC&D program and the county installed the improvements, using its own equipment and employees from a Title X Program administered by the Oscoda County SCD.

"As the work was completed and the scars of erosion were healed, local people regained pride and interest in the park," explained Barney Kinney.

One of the major events held annually at the park is the Great Lakes Forestry Exposition. The exposition includes forestry and sawmill equipment demonstrations, exhibits, special entertainment, and a log birling contest. During the exposition, the park is packed with campers, exhibitors, and other tourists.

Before the RC&D measure, a hill overlooking the river was used as an amphitheater for entertainment and as a vantage point for watching the birling contest. Because of overuse, it was subject to erosion. The community wanted to build a modern amphitheater that would seat 800 people but did not have the funds to do it. Local groups put on a fund drive and hired an architect to provide a design. Aided by a grant from the Michigan Bicentennial Commission, the community built the outdoor theater with help from Comprehensive Employment and Training Act employees. SCS provided technical assistance with site planning.

SCS also assisted with developing plans for a modern restroom facility that was needed to improve the park. The restrooms were built and financed through a Title X Program administered by the Upper Great Lakes Regional Commission.

In the future, the community plans to relocate and expand the campgrounds and improve the day-use area. Its long-term plans are assuring that this valuable natural resource will be protected.

Mr. Church was RC&D coordinator, SCS, Grayling, Mich., and is now resource conservationist, SCS, East Lansing, Mich.

Recreation Times Two

In North Dakota, two watershed projects were planned to provide flood protection and recreation, too.

Silver Lake, A Shining Example

by Myron P. Senechal and Elmer R. Umland

"The Silver Lake recreation area is the nicest and best kept park that we have been in—and we have been in every State in the Union," said Ralph and Loa Campbell of Niagara Falls, N.Y., during their visit last summer. But Silver Lake in the Tewaukon watershed near Rutland, N. Dak., was not always listed in guides to the Nation's parks and campgrounds.

The construction of a Work Projects Administration dam in the 1930's raised the water level in the lake. A small recreation area with a boat dock and beach was developed, but it slowly deteriorated.

The dam was repaired several times through the years and in 1955 a severe summer storm caused damages in the watershed totaling more than $300,000. This and the previous problems with flooding and erosion prompted the Sargent County Water Conservation and Flood Control District, the Wild Rice Soil Conservation District (SCD), and the Marshall County Conservation District in South Dakota to join in sponsoring a flood control project plan for the watershed. Under the Public Law 566 small watershed program, the Soil Conservation Service helped plan and design the new diversion and spillway.

Local people, some remembering the recreation facilities that had been around the lake in the 1930's, organized a committee to investigate the possibility of developing new recreation facilities as part of the project. Financial contributions from people in the community, equipment and labor donated by the Sargent County commissioners and the Wild Rice SCD, tractors and trucks donated by farmers, and services offered by individuals and organizations demonstrated the interest and enthusiasm in the project.

The county commissioners formed the Sargent County Park Board to handle the funds and direct the recreation area project.

Under Public Law 566, SCS designed the recreation facilities and provided 50 percent of the land cost. The work plan for the Tewaukon watershed project was modified to include the recreation area, and construction began in the summer of 1967. The recreation area covers close to 200 acres—about equal amounts of land and water.

The North Dakota Game and Fish Department shared part of the cost of purchasing the land on the northwest side of the lake with the Sargent County Water Management Board. The Sargent County Park Board also shared part of the land cost.

The recreation area includes a beach for swimmers, a boat ramp, a softball diamond, picnic shelters and tables, outdoor grills, two wells, sanitary facilities, and more than 10 acres of tree plantings. There are 18 horseshoe courts used by leagues throughout the summer.

SCS also helped plan areas of the park for wildlife habitat.

The Wild Rice SCD hosts a conservation and environmental tour of the recreation area every year for all Sargent County seventh grade students.

In the summer, the recreation area employs two people full time. "This is my pride and joy—keeping up a park that is appreciated by so many people," said Ole Breum, the recreation area manager, former legislator and Sargent County Water Management Board member, and early promoter of the project.

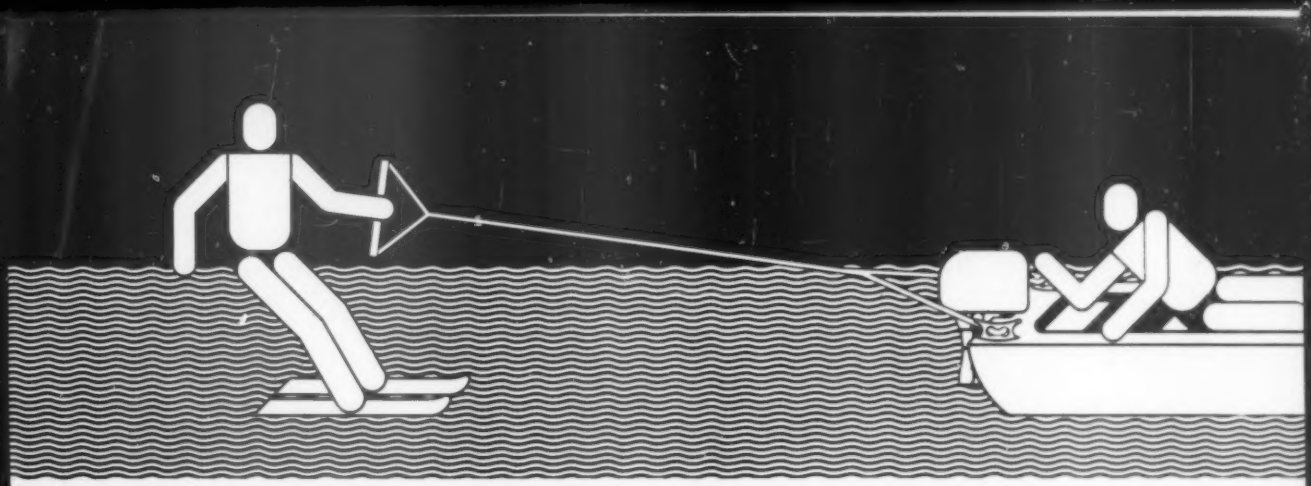
In addition to recreation facilities included in the project, local organizations and clubs wanted a reliable supply of fish to stock Silver Lake and other county lakes. The North Dakota Game and Fish Department, the Sargent County Park Board, the Sargent County Water Management Board, and the North Dakota Bureau of Outdoor Recreation helped the community plan and install the Silver Lake fish rearing pond. SCS designed the pond which is used to raise fry to fingerling size for stocking public lakes.

When filled, the fish rearing pond, which is 250 feet from the lake, covers 2.5 surface acres and holds about 2½ million gallons of water. Walleye is the principal fish reared in the pond, and in 1977, Silver Lake was stocked with 8,000 fingerlings from it.

The North Dakota Game and Fish Department assists the Sargent County Park Board in managing the pond and stocking other large county lakes.

"I wish all of our fish rearing ponds were as well kept and had the perimeter growth and natural layout of Silver Lake's pond," said Gene Van Eckout of the North Dakota Game and Fish Department.

The Tewaukon watershed project and its recreation area and the fish



rearing pond are an example of what can be achieved by people from Federal, State, and county governments working together with local organizations and individuals toward a common goal. The uses and benefits can be far reaching—all the way from North Dakota to New York.

Mr. Senechal was district conservationist, SCS, Forman, N. Dak., and is now district conservationist, SCS, Mandan, N. Dak.
Mr. Umland is public information officer, SCS, Bismarck, N. Dak.

A Dream Come True

by Martin C. Lund

For many people, the completion of a multiple-purpose watershed dam on the Upper Turtle River near Larimore, N. Dak., will be a dream come true. The structure is planned to store about 4,200 acre-feet of floodwater runoff and provide a permanent, 72-acre lake. Adjacent to the lake, a 510-acre recreation area is planned. It will include beaches for swimmers, boat docks, shelters, nature trails, and picnic areas with tables and outdoor grills. The dam will also provide a reliable source of water for the irrigation system on the Larimore golf course.

The multiple-purpose dam is part of the Upper Turtle River watershed project authorized under Public Law 566. It and the other structures in the project were designed to control flooding of agricultural land along the river caused by snowmelt and severe summer storms.

County commissioners, water management boards, and the soil conservation districts of Nelson and Grand Forks Counties worked with the Soil Conservation Service, other USDA agencies, and the State Water Commission in planning a flood control program for the Upper Turtle River watershed. The plan calls for 26.5 miles of channel modification, 7 floodwater detention dams, 1 multiple-purpose detention dam, and 2 grade stabilization structures. In 1970, Congress authorized construction of the project.

"The watershed approach to flood control and community development is the sound way to go," said ElDee Cummings, former Grand Forks County Commissioner. "These dams could have saved the county many washed-out bridges in the years we experienced heavy runoff."

The multiple-purpose dam will be the seventh dam constructed on the Upper Turtle River.

Many public and private groups were involved in the promotion of the multiple-purpose facility. The Larimore Commercial Club assisted in public hearings, and the Larimore Golf Association helped develop and maintain interest in planning the dam with recreation in mind.

The Grand Forks County Management District purchased needed rights-of-way and will maintain the recreation facilities around the lake. "I have always felt that we should develop all of the watershed projects for the maximum benefit of the local community," said Art Thornaldson, former chairperson of the Grand Forks Water Management Board. "I am sure future generations will agree with this type of planning."

The Western Grand Forks County Soil Conservation District will help develop wildlife habitat and plant windbreaks. The Grand Forks Water Management Board has set aside 25 acres of the recreation area to be used as an arboretum.

SCS planned and is supervising construction of the multiple-purpose dam. SCS also helped plan the irrigation system on the Larimore golf course, and Farmers Home Administration provided financing for it.

A private engineering firm developed the plans for the recreation facilities.

Construction of the dam and the recreation facilities began in 1977. They should be ready for public use by 1979.

"I often thought building a series of dams to hold runoff in the highlands would prevent a lot of downstream flooding," said Simon Fagstad, former member of the Grand Forks County Management Board. "I also like the idea of the recreation development on the dam site near the Larimore golf course. You see, I'm an avid golfer and will enjoy the view of the lake. It will also provide recreation for many of my friends and neighbors."

Mr. Lund was district conservationist, SCS, Grand Forks, N. Dak., and is now retired.

Beauty Among the Tupelos

A South Carolina swamp of giant cypress and tupelo trees has been preserved as a natural area for residents and tourists.

by Keith R. Cain

Not many people have ever visited deep into the heart of a low-country swamp. Few have ever walked among the towering cypress, tupelo, and natural bee trees or watched the wood ducks, redbreast sunfish, and pickerel.

Now, thanks to a community effort, all this is possible. A remnant of Pocotaligo—one of South Carolina's most famous black water swamps—has been saved and is open to the public.

The swamp forms a cool, shady canopy over Route 301 and has long been a landmark to local citizens and tourists from Maine to Miami. But because of the value of the fine timber on the land, the swamp was nearly lost.

When logging operations began several years ago in the area, local residents persuaded the Georgia-Pacific Corporation to donate 50 acres adjacent to the highway and persuaded the Bartow Shaw family to donate an additional 15 acres to be left in a natural condition as a scenic area.

Even though the swamp—which lies only a few hundred feet from downtown Manning—was preserved, local leaders wanted to do more. F. E. DuBose, Henry Rickenbaker, and D. L. Goldsmith, who represented Clarendon County on the Santee-Wateree Resource Conservation and Development (RC&D) Measure Committee, adopted the Pocotaligo Conservation Area Park as a committee objective. They asked Soil Conservation Service specialists for help in planning the park.

The boardwalk, shown under construction, provides a scenic pathway.

An SCS biologist made an inventory of the vegetation and wildlife in the area. He found giant cypress trees, tupelo trees, and hollow trees that wood ducks used for nesting. In addition to wood ducks, he found raccoons, opossum, bobcats, deer, and songbirds. An SCS hydrologist gave advice on locating the proposed boardwalk so it wouldn't be washed away during flooding. Other advice included the type of material to use for the boardwalk, the amount of fill needed, and the location of the parking lots, restrooms, and picnic areas.

After the plan was developed, it was submitted to the U.S. Department of the Interior's Bureau of Outdoor Recreation (now the Heritage Conservation and Recreation Service) for approval of funding. The Bureau approved the plan and provided the money for construction which was done by a local contractor. SCS provided additional technical assistance to the community by inspecting the construction to see that it was done according to the plan.

Today, Pocotaligo Conservation Area Park is a reality and residents and tourists can enjoy a peaceful walk through the giant trees on the 1,300-foot-long boardwalk.

"It took a lot of hard work and determination," said RC&D Coordinator Fred McLaughlin of Sumter. "The secret of the park's success was the fact that the people wanted the park enough to get involved."

Mr. Cain is district conservationist, SCS, Manning, S.C.

Feedlot Runoff Control

Simple, inexpensive systems for controlling animal waste often can be just as effective in preventing pollution as complex and costly ones.

by Orbin Brandvold

Ralph Bladow and his son Leon installed a simple but effective system that keeps their feedlot runoff from polluting the Wild Rice River in Richland County, south of Fargo, N. Dak.

In 1974, the Bladows wanted to build their feedlot where it would be protected by a windbreak planted by the farm's former owner. The ideal location, however, was only 100 feet away from the river.

Cooperators with the Richland Soil Conservation District, the Bladows called on the Soil Conservation Service for assistance in controlling the runoff. SCS designed a 1,100-foot-long settling channel that winds around a 3-acre feedlot and empties into a holding pond. Diversion ditches and dikes contain the feedlot runoff and keep clean runoff away from polluted areas.

The State Health Department approved the project, and the Agricultural Stabilization and Conservation Service shared the $1,500 cost through the Agricultural Conservation Program.

"The system does what it was designed to do," said Leon Bladow. "And it saves us from working in mud in the springtime. The feedlot dries out in 1 week; it would take a month to dry without the system."

Because most of the precipitation in the area falls as snow, almost all the runoff is snowmelt in the spring. It flows through the channel into the holding pond where it evaporates, leaving the pond dry by summer.

The holding pond, which has a capacity of 1 million gallons, has overflowed only once, and that was during unusually heavy rains in 1975.

With a waste management system designed by SCS, the Bladows are controlling animal waste from their feedlot and protecting a nearby river from pollution. The animal waste diversion and settling channel, in foreground, and a holding pond are the main features of the system.

Overflow is diverted through 2 miles of ditches to allow the waste to settle out before the water reaches the river.

To improve drainage and provide dry areas for the livestock, the Bladows piled mounds of earth in the feedlot. They scrape washed-in soil out of the settling channel once a year and add that material to the mounds.

Because of the good drainage, most of the manure stays by the feeder. It is scraped up and spread as fertilizer on fields of corn, soybeans, small grains, and sunflowers.

Little solid waste reaches the channel, and after 3 years of use, there is only an inch of manure on the bottom of the holding pond. At that rate, Ralph Bladow figures that the pond will not need to be cleaned out for 20 years.

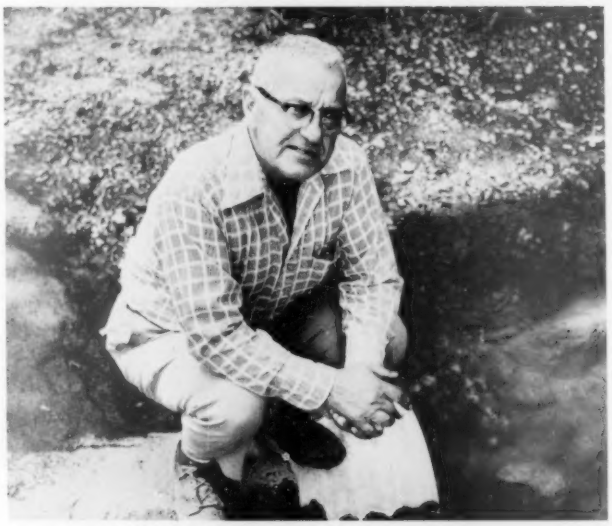
The Bladows also seeded the dikes with bromegrass and alfalfa to provide nesting cover for ducks, and they wait to cut the grass for hay until hatching is completed. Geese and pelicans as well as ducks use the holding pond in the spring.

"I like to hunt and fish," said Leon Bladow, "and if I can conserve wildlife, I'll do my part."

Mr. Brandvold is district conservationist, SCS, Wahpeton, N. Dak.

George Townsend, Dust Bowl Veteran

by Michael M. Price



George Townsend, SCS district conservationist at Anderson, Ind., has been with SCS since its beginning in 1935. Except for 5 years in the Army Air Force during World War II, he has devoted his career in Federal service to fighting erosion.

George Townsend, Soil Conservation Service district conservationist at Anderson, Ind., belongs to a very distinguished group. He is one of the few employees still with SCS who worked with its parent agency, the Soil Erosion Service (SES).

Townsend started his career with SES on July 16, 1934, with training at an erosion control school in Zanesville, Ohio. SES and the Civilian Conservation Corps (CCC) had just begun working to combat erosion. There was a growing need for qualified people to provide technical assistance on demonstration and CCC camp projects.

Townsend's first appointment with SES was as a junior soil surveyor at several camps and demonstration projects. Soils information he compiled was used to determine the best land use for an area and to plan proper treatment for erosion control.

"That was in the days of the Depression and the Dust Bowl, and we were trying to help farmers hold their soil the best way we knew how," said Townsend.

In 1935, SES was moved from the U.S. Department of the Interior and became the Soil Conservation Service of the U.S. Department of Agriculture.

The new agency continued working with the CCC, but top officials became concerned that they weren't able to reach enough people through the demonstration projects and CCC camps. "Since CCC enrollees could be transported only within about a 30-mile radius of their base camps, farms farther out often couldn't be reached," Townsend said.

President Roosevelt urged States to pass laws allowing the formation of conservation districts. By 1947, all States had passed such laws.

"The biggest change I've seen in SCS operations was the formation of soil conservation districts," Townsend said.

"One of the most important ways that the districts have been able to help SCS get the conservation job done is by explaining to people what we're trying to do. If land users understand, they'll be more willing to cooperate. Also, the cost-share assistance available to cooperators through the Agricultural Stabilization and Conservation Service has been very helpful."

George Townsend is now in his 44th year of service. He has worked to help land users control erosion and improve the land in six States: Ohio, Missouri, Tennessee, Illinois, Wisconsin, and Indiana.

When asked if he'd do it all over again, Townsend replied, "Yes. I like the out-of-doors; I like working for the public; and I like soil and water conservation opportunities. I had the chance to switch professions when I returned after 5 years in the Army Air Force during World War II, but I came back to SCS. I believe it is truly worthwhile work.

"My generation pioneered proper land use and appropriate treatment of soil and water resources. It's important that succeeding generations continue and expand upon the conservation work we've begun for the benefit of mankind."

Mr. Price is public information officer, SCS, Indianapolis, Ind.

Clearwater Revival

by Anne Schuhart

In the 1930's and 40's, field days held across the country demonstrated conservation practices to large numbers of farmers. One field day in Maryland impressed local residents so much that they are going to do it again.

The August morning dawned clear and hot, as usual, over Middletown Valley. But on that day 30 years ago, the rising sun was about to illuminate an event that would remain in the minds of Marylanders for decades to come.

A blast rang out, echoing back from South Mountain, and as the smoke and dust from 100 pounds of dynamite billowed into the air, 500 men and 200 machines dug into the dark brown earth of Widow Nellie Thrasher's farm. Tens of thousands cheered the workers, who would transform nearly 200 acres of gullies and wornout land into a model of conservation that day.

The Thrasher Field Day, held August 18, 1948, was sponsored by the Grange in cooperation with the Catoctin and Frederick Soil Conservation Districts (SCD's) and the Soil Conservation Service. Its purpose was to demonstrate in 1 day the practices a farmer could install over a period of years to protect his soil and maintain productivity. Neighbors in Frederick County donated labor and equipment, and more than 40,000 people came to learn new farming techniques.

Volunteers re-formed the widow's fields to conform to the shape of the land. They tore down old fences and built new ones, all on the contour. They laid out crop strips, also on the contour, and planned a crop rotation of clover, corn, wheat, and barley.

A steep, badly eroded hillside was limed, fertilized, and reseeded for pasture. Its gullies were graded and sodded with grass to form safe waterways, and three diversions were constructed across the slope to intercept runoff water and direct it to a prepared outlet. Men on bulldozers scooped out a pond while others laid subsurface drainage tile and opened a drainage ditch to control the water at the foot of the hill.

Higher up the mountain, other volunteers fenced a woodlot to keep grazing cattle out. They planted good quality seedlings and thinned out some of the poorer trees, using the lumber for the fence building and construction taking place on the farm below.

To house the extra dairy cattle the widow could feed with a higher producing farm, neighbors built a new barn and silo. They also gave the house a fresh coat of paint, planted shrubs, and improved the lane leading in from the county road.

The Thrasher Field Day was held at a time when erosion and poor

More than 40,000 people witnessed the day-long transformation of Nellie Thrasher's farm in the summer of 1948. The contour strips, diversions, and waterways installed are still working to keep water clear of sediment today.

farming practices were threatening the country's agricultural production. The event emphasized that good conservation maintains or even improves productivity.

"I can personally vouch for the fact that the conservation practices installed that day have increased productivity," declared Henry D. Lakin, Sr., chairman of the Catoctin SCD. "In 1954, I purchased that farm from Mrs. Thrasher, who was my sister. I have maintained the contour strips, waterways, diversions, and other practices the same today as they were 30 years ago.

"I can also vouch for the fact that those soil conservation practices have helped keep sediment and other pollutants out of the runoff water from the farm," Lakin continued. "If you control runoff and erosion, it automatically follows that you'll reduce the amount of sediment, nutrients, and chemicals that get into our waterways."

Lakin bought the farm out of a sense of history: the land has been in his family since before the Revolutionary War. He maintained the conservation practices because they work and because of a sense of stewardship.

"Today's farmers have an obligation to tomorrow's generation," he explained. "If we allow erosion to occur uncontrolled, we are carving a grim destiny for our grandchildren."

Lakin said he first learned about conservation in the late 1930's. "Down the road from the Thrasher farm and across the road from my home place is the Dade farm. I remember when Morris Lee Dade was going to put in contour strip-cropping. His grandfather asked me

SCS District Conservationist Paul Edwards shows the erosion on the Roelkey farm.

On the Thrasher farm, the pond, grassed waterways, and contour strips are maintained just as they were put in at the field day 30 years ago.

Include the conservation event of the decade in your vacation plans! Project Clearwater, a colossal, old-fashioned conservation field day, will be held Saturday, August 19, in Frederick County, Md. On that day, 500 volunteers will reshape a wornout 245-acre farm into a model of soil and water conservation.

Project Clearwater, however, is not just an exercise in nostalgia—the Catoctin and Frederick Soil Conservation Districts are staging the event to show people that the Nation's clean water goals are attainable and that soil conservation helps.

Along with the serious message of the field day, there will be plenty of fun things to see and do, including hayrides, nature walks, and an antique tractor show. For overnight visitors, camping space will be available nearby.

what I thought of the idea. I said, 'Not much.' But once he got the strips in, I liked what I saw. I put in my stripcropping the next year, 1940.

"People would come by and see my strips, and the next year two or three more farmers would put in strips. Then, of course, we had the Thrasher demonstration.

"Today, this whole side of the valley is pretty well stripcropped. I don't mean to sound like I'm bragging, but all the *good* farmers stripcrop."

Farmers are likely to adopt different farming or conservation practices only after they've seen them demonstrated.

With this in mind, the Catoctin SCD will reenact the Thrasher Field Day on August 19, 1978. This time, however, the event is being called Project Clearwater. Its purpose is to demonstrate to rural and urban people alike that soil and water conservation is vital to help clean up the Nation's streams and rivers by controlling nonpoint source pollution.

With the help of the Frederick SCD, the Catoctin SCD will completely renovate a 245-acre farm belonging to Warren Roelkey of Knoxville, Md. The Roelkey farm is located across the valley and within sight of the Thrasher farm. Two streams on the property eventually flow into the Potomac River, making the site ideal for the water quality project.

Project Clearwater will include installing contour stripcropping, relocating fences, renovating pastures, building a pond, putting in waterways and diversions, improving a stand of timber, repairing farm buildings, and installing a new animal waste management system. Other attractions will include notable speakers, a brass band, hayrides, and maybe even an air show.

Money, equipment, materials, and labor are being donated by businesses, individuals, government agencies, and civic organizations. "Judging from the enthusiasm in the county, we expect Project Clearwater to draw 80,000 people—twice the number who attended the Thrasher event," said Lakin.

The district plans for Project Clearwater to be a conservation event that will remain in the minds of a new generation for the next 30 years—and more.

Ms. Schuhart is a writer-editor, Information Division, SCS, Washington, D.C.

The Roelkey farm (left) will be renovated under a conservation plan prepared by SCS. At right, Warren Roelkey signs his contract as a cooperator with the Catoctin Soil Conservation District. From left to right are: Paul Edwards; Roelkey; Henry D. Lakin, chairman of the Catoctin SCD; and Daniel C. Poole, chairman of the Project Clearwater steering committee.

Mahantango Means Watershed Research

by Harry B. Pionke
and Joseph D. Sieck

Hydrology research at a watershed in the Northeast provides data for determining the impact of land-use plans before they are installed.

The Mahantango Creek watershed is the major field study area of USDA's Northeast Watershed Research Center. This center is one of 10 such installations located throughout the United States. The research watersheds are part of the Watershed Research Program which originated within the Soil Conservation Service in the 1930's. The program was transferred in the 1950's to the Agricultural Research Service, which is now a part of the Science and Education Administration, Federal Research (SEA–FR).

Originally the Watershed Research Program was designed to determine the major hydrologic factors affecting runoff and erosion according to Major Land Resource Areas. This is still a major objective. The data and relationships resulting from the watershed studies have been used extensively to improve procedures and structural designs for controlling runoff and erosion.

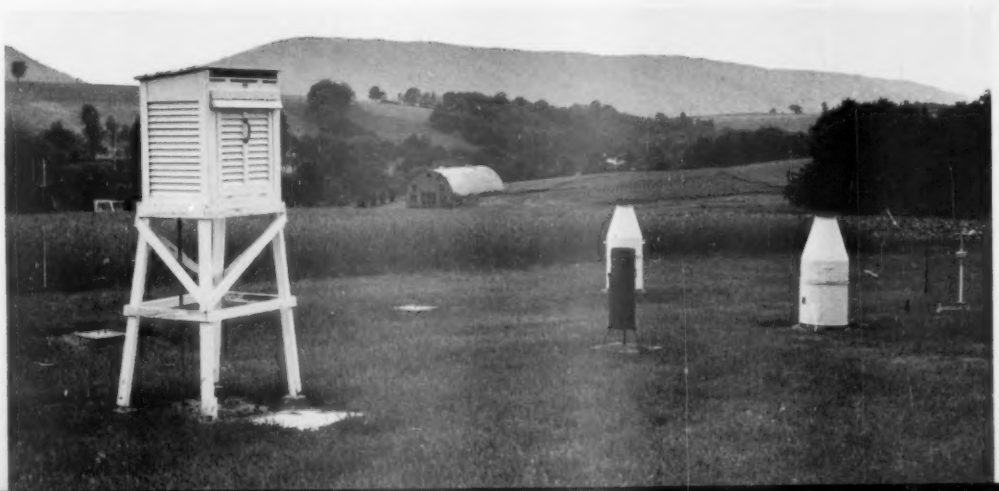
One byproduct of the research has been long-term and diverse hydrologic data records. The North Appalachian Experimental Watershed at Coshocton, Ohio, for example, has been collecting hydrologic data since the 1930's. Universities and Federal agencies use the data in applied and basic research—to develop and test hydrologic models and concepts and to test hydrologic hypotheses, among other purposes.

The Mahantango Creek watershed is one of the newest research watersheds, having been operated continuously since 1966. This 161-square-mile basin of the Susquehanna River is located approximately 30 miles northeast of Harrisburg, Pa. It is the only completely operational SEA–FR research watershed in the Northeastern Region. A similar research program is being carried out on the Sleepers River watershed near St. Johnsbury, Vt. However, this program, which emphasizes snowmelt hydrology research, operates only part of the year with a skeleton gaging network.

The land use and management of the Mahantango Creek watershed are typical of many agricultural areas located in the mountainous Northeast. The land use is 57 percent agriculture and 42 percent forest with most of the forest not managed for timber production.

The major farming activities are dairy, poultry, and livestock raising, mainly on small family farms of less than 200 acres. The objective of most cropping is to provide forage and feed for onfarm consumption by livestock. Normal fertilizer practices consist of manuring and applications of a complete fertilizer to corn or small grains in the corn-oats-hay-hay rotation. This 4-year rotation is typical, with much of the hay being alfalfa.

Generally, the farmers follow the soil and water conservation practices recommended by SCS, such as contour stripcropping with waterways and diversions, minimum tillage and no-till, terracing, grassed waterways, and winter cover crops. There is little visible evidence of erosion,



This outdoor laboratory is equipped to measure humidity, rainfall, wind speed, and evaporation rates. The data are used to determine how the amount of rainfall and its intensity affect runoff and erosion. The data is useful in designing floodwater control measures and other conservation practices.

stream eutrophication, or poor land and water management. The watershed contains some coal mining activity and a few villages, but no substantial urban areas.

The research staff that operates the Mahantango Creek Research Watershed consists of 18 scientists and supporting personnel located at the Pennsylvania State University campus, University Park, Pa., and 6 hydrologic and construction technicians with supporting personnel located on the watershed near Klingerstown, Pa. The scientists operate the watershed as an outdoor laboratory with the primary goal of solving hydrologic and associated water quality problems particular to the Northeast. Some of these problems result from surface coal mining and urbanization. The technicians operate the general data collection network, construct special experimental sites, and operate and maintain special study networks. Since 1966, they have collected climatic and hydrologic data including rainfall, evapotranspiration, ground water, soil water, and streamflow data.

As the research program progressed and early objectives were reached, the instrumented area of the watershed was reduced from 161 to 44 square miles. The watershed includes a 3-square-mile subwatershed which is intensely instrumented and is used as a site for many special studies. In 1970, for example, water quality studies were initiated to determine the nitrogen and phosphorus content of runoff and the source of the runoff.

The research at the Mahantango Creek watershed supports the Northeast Watershed Research Center's overall goal of developing simulation capabilities that can be used to determine the hydrology-water quality impact of alternative land-use plans.

The goals of the watershed research are varied. The scientists are working on:

- Locating chemical and water source areas on an agricultural watershed.

- Simulating soil water, ground water, and associated chemical transport.

- Developing techniques for ground water recharge and peak flow reduction.

- Modeling the hydrology and chemistry of coal surface mine spoil—runoff, erosion, and acid production.

After hydrology-water quality relationships are developed on the watershed, the scientists field test them at several research satellite locations outside of the watershed. In this way, the relationships can be tested under a different set of conditions and under conditions directly related to the problem, such as at a surface mine site.

Concrete weirs measure water flow in the research watersheds. Equipment in the building to the left of this weir in the Mahantango Creek watershed measures water level. Data collected at the stream gaging sites can be used with meteorological data to estimate the amount of runoff that will accompany a certain sized rainfall.

Mr. Pionke is supervisory soil scientist, Northeast Watershed Research Center, SEA–FR, University Park, Pa.
Mr. Sieck is supervisory hydrologic technician, Northeast Watershed Research Center, SEA–FR, Klingerstown, Pa.

by Luther C. Geiger

An SCS soil scientist spent more than 3 years in Liberia, helping several young people to prepare themselves for conducting a countrywide soil survey.

Soil Survey in Liberia

Barclayville is a typical village in eastern Liberia. The need for soil surveys is no less here than in more developed countries.

Liberian soil survey trainees set up measuring tape at a pit dug for soil examination and sampling. The training they receive will enable them to make a nationwide soil survey in Liberia.

Liberia, a tropical country on the West Coast of Africa, is pushing ahead with a national soil survey. I recently returned from a 3½-year assignment there, helping Liberians in a training program for mapping, classifying, and interpreting their country's soils.

My job was to direct a soil survey project sponsored by the U.S. Department of State, Agency for International Development (AID). The other project members and I worked with Liberian young people, giving them on-the-job training in conducting soil surveys. Our goal was to develop a professional staff capable of conducting such a survey on a national scale.

Liberia badly needs a national soil survey.

When it was settled in 1822, the land was largely a tropical forest with a rainy, superhumid climate. Now, it consists mostly of secondary growth from slash-and-burn farming practices. Upland rice is the major crop, supplemented by cassava and eddoes, potato-like root vegetables.

Liberia is trying to boost domestic rice production and reduce dependence on imported rice. It hopes to raise the income of its small farmers, who now earn only about $60 to $70 annually. It wants to carry out more cooperative farming projects with forest tribal people, who comprise more than 97 percent of the population.

Soil surveys can help meet all three national goals.

To increase domestic rice production, the Liberian Ministry of Agriculture concentrates on spreading the

Trainees use a soil map to locate soils suitable for growing oil palm. The site will be cleared, seedlings planted, and permanent production maintained. The forest in the background is being burned before planting upland rice and cassava. According to tradition, the land will be farmed for 2 years and then laid fallow for 5 to 10 years to restore fertility.

technique of paddy rice farming and on developing better agronomic methods for producing upland rice. Soil surveys help locate the best swamps for growing paddy rice.

To raise small farm income, the Ministry is looking for better ways to help farmers who produce tree crops like cacao, coffee, oil palm, and rubber. Soil surveys contribute by pinpointing the areas best suited for growing these crops.

To help forest tribal people, the government clears several thousand acres of forest each year for cooperative farming projects. Soil surveys indicate where the most productive soils are located.

The first job assigned to our team was to make a soil survey of the 1,700-acre Central Agricultural Experiment Station at Suakoko—about 120 miles inland from the capital city of Monrovia. Our group dug about 30 pits and made dozens of auger borings.

The Soil Conservation Service National Soil Survey Laboratory in Lincoln, Nebr., analyzed samples from six of the major soils. Then, our team developed a soil survey report, modeled after reports prepared in the United States. It was published through a cooperative agreement between SCS and AID.

The survey provided an excellent demonstration of "how to do it." It illustrated for Liberian trainees the general nature of soil surveys and how these surveys can be used. It indicated the texture, color, structure, and other characteristics of soils found in Liberia. And it showed the trainees how to write survey reports by actually working on one.

We also helped Liberian personnel at the experiment station's soil laboratory to select new, modern equipment and to learn how to conduct laboratory analyses.

The soil survey staff, which had little equipment at the beginning of the project, is now well-equipped with basic tools, including a library of reference books on soils and tropical agriculture.

Joseph Famolu, of the Ministry of Agriculture's Soil Division, worked with us. He holds a master of science degree in soil science from Oklahoma State University. Famolu and I traveled to neighboring Ghana and Ivory Coast to study soils and agronomy. Because the soils situation in those countries is similar to that in Liberia, we were able to use the data we obtained in making survey interpretations at the experiment station.

In addition, the team carried out several special projects. We began a general soil map of Liberia. We started a collection of soil samples to assist in correlating soils throughout the country. And we developed a national soil handbook, containing up-to-date descriptions of the soil series, laboratory analyses, and interpretive tables.

SCS soil scientists offered technical assistance during the work. Among those called upon were Westal Fuchs, assistant director of the SCS Soil Survey Operations Division, and Paul Johnson, assistant soil correlator of the SCS Technical Service Center at Lincoln, Nebr.

I returned last August to my job as soil scientist with the SCS Technical Support Staff at Temple, Tex., assured that Liberian scientists and technicians had established a solid base on which to build.

The Ministry of Agriculture's Soil Division now receives far more requests for soil surveys than the present staff can handle. When the project began in 1974, the Liberian soil survey division had only three people partially trained in making soil surveys. When the project ended, 13 people were actively engaged in making surveys and recommendations. An estimated 35 to 40 people still are needed.

Leadership, however, is not lacking. Serving with Famolu is Charles Mulbah, who earned a master's degree from the University of Tennessee, and Coker George, who received a master of science degree from the University of California at Chico and who spent 8 months in soil survey internship training with SCS in Florida. They will be joined soon by Walter Wiles who is receiving advanced training in soils at the University of Hawaii.

Mr. Geiger is a soil scientist, SCS, Temple, Tex.

After spending 2 years in Nicaragua assisting with improving livestock production, an SCS agronomist returned 12 years later to help with a wind erosion problem.

by Gerald M. Darby

Controlling Wind Erosion in Nicaragua

In 1972, Christmas season celebrations in Nicaragua were shattered by a severe earthquake. It leveled much of the capital city of Managua, killed about 6,000 people, and left another 200,000 homeless. At the same time, the Central American Republic was in the grip of a severe drought.

These two natural calamities temporarily slowed the country's economic progress, but did not alter its long-term development.

I had the opportunity to observe Nicaragua "before and after." About 12 years ago, I served there for 2 years as a member of a U.S. Department of Agriculture and Agency for International Development team assisting the country in improving agriculture. Last year, I returned for 1 week to help assess increasing wind erosion problems and suggest solutions.

Earthquake scars are most visible in Managua's old town area. Only a few skeletons of buildings and some weedy vacant lots remain in what was once a bustling section with some 100,000 inhabitants. Survivors of the earthquake have relocated on the outskirts of the former city or live with their village relatives. A building that formerly housed the Ministry of Agriculture has been destroyed. Hardly a stone of the U.S. Embassy building remains. The apartment building where I lived with my family during our first 3 months in Nicaragua suffered heavy damage.

But Nicaraguans are busily rebuilding their country, physically and economically.

Nicaragua depends on agricultural products like cotton, coffee, and sugarcane to provide much of its foreign exchange. World prices for these commodities fluctuate sharply, producing similar ups and downs in Nicaragua's economy. Agricultural planners there hope that an expanding livestock industry will help stabilize annual earnings.

During my first tour of duty in Nicaragua, I worked with a team of specialists to assist in improving livestock production. We offered pasture management training to technicians of the Ministry of Agriculture, the National Bank, the Agrarian Reform Institute, and the National Development Institute of Nicaragua. The team assisted with livestock and pasture management demonstrations.

We also aided the National Research Station in collecting native legume seed and in conducting pasture fertilizer trials. The team took grasses that were doing well in one part of the country to other areas for trial and propagation.

The teamwork helped the Nicaraguan livestock industry prosper and gave a much needed lift to the country's economy. A Nicaraguan Government advertisement in the *Wall Street Journal* last January reported an increase in per capita income from $241 in 1960 to more than $825 in 1976.

I returned there last year in re-

At left, skeletons of buildings and weedy vacant lots are all that remain in an area of Managua where more than 100,000 people lived before the 1972 earthquake.

At right, Hugh Evans of the British Forestry Mission evaluates cultivars of eucalyptus for field windbreak use.

sponse to a Nicaraguan request for help in dealing with a worsening wind erosion problem. Wind erosion threatened commercial cotton production—a vital element in Nicaragua's international balance of payments.

Nicaraguan farmers had begun large-scale cotton production many years ago. Yields are good, largely because farmers apply good production practices that include fertilizers and pesticides. By producing continuously, however, they cause deterioration of soil aggregates and soil tilth, making the land more likely to erode when strong easterly winds blow.

From seedbed preparation in June until about a month after cotton planting in July or August, the soil remains loose. Without protection from severe gusting winds, long-term loss of soil fertility is certain.

Wind erosion also degrades air quality in some urban areas. Clouds of blowing dust often obscure visibility at airports and on highways. Mountainous dust clouds sometimes have engulfed the city of Leon and forced the closing of Las Mercedes International Airport at Managua.

Nicaraguan cotton growers rely on field windbreaks to hold the soil in place. Three rows of trees in each windbreak are 3 meters apart. Plants within each row are 2.5 meters apart.

My recommendations for controlling wind erosion included wind stripcropping, conservation tillage, and ridged seedbeds. Further research and field trials are needed to adapt these practices to Nicaraguan conditions.

Napiergrass, a tall-growing plant that would reduce ground wind speed, shows promise for stripcropping. Two rows of it could be planted with 12 to 16 rows of cotton. In another system, four rows of corn—or two rows of tall-growing sorghum—could be planted with 8 to 12 rows of cotton. Conservation tillage also would help.

Instead of using moldboard plows, disk plows, or disk harrows, farmers could prepare ridged seedbeds with listers. The resulting soil roughness would help slow the wind. When planting, seed would be pushed down into the moist soil, knocking off 3 or 4 inches from the ridge top. This technique assures an excellent stand and eliminates replanting, even in drier-than-normal times.

Decisions on these suggested techniques rest in the capable hands of Klaus Sengelmann, Minister of Agriculture.

The earthquake may have changed the physical character of Nicaragua, but not its moral fiber. Nicaraguans are intensely interested in solving their wind erosion problems.

Mr. Darby is staff agronomist, Ecological Sciences and Technology Division, SCS, Washington, D.C.

Nicaraguans prepare a site for planting a windbreak (far left). Three parallel rows of trees will be planted: eucalyptus in the middle, leadtree to windward, and cassia. Seedlings are distributed (near left) for windbreak plantings.

Stabilizing a Coal Refuse Pile

A coal company in southwestern Virginia revegetated its waste pile with a variety of woody plants, grasses, and legumes.

by Sheridan I. Dronen
and Charles S. Pendleton

Ten years ago, Don Jones, manager of preparation for Clinchfield Coal Company in Lebanon, Va., saw a slide presentation about the work the Soil Conservation Service was doing on revegetating surface mine spoil. He discovered that SCS has been working with coal companies for more than 20 years and had developed new plants through a plant materials program for revegetating spoil areas.

Jones turned to SCS for help in revegetating and stabilizing Clinchfield's waste pile which had accumulated during the 20 years that the coal company's processing plant had been in operation. The waste pile was more than 400 feet high and covered about 30 acres. It consisted mostly of limestone, shale, sandstone, and some coal fragments. The texture of the waste material varied from very fine powder to 4-inch pieces or bigger. The material was unstable and subject to erosion.

When SCS personnel first visited the waste pile in 1968, they spotted a clump of orchardgrass growing near the edge, which was an indication that plants might be able to grow on the pile. They ran a soil test to determine if the waste contained anything toxic to plants and to determine what nutrients would have to be added. They found that the waste material had a pH of 8.9 and that it was high in calcium, magnesium, and organic matter; medium in potassium; and low in phosphorus. They also noted that since the material was black, it would absorb heat which would make surface temperatures very high, especially during the summer, inhibiting seed and plant growth.

Using information gained from trial plantings at plant materials centers, SCS specialists determined which plants would be most likely to successfully stabilize the Clinchfield Company's coal refuse pile in Lebanon, Va.

From previous experience in an adjoining county in revegetating magnesium spoils and from trial plantings conducted by the SCS plant materials centers, the SCS specialists knew of several plants which they thought would grow on the waste pile.

In the fall of 1968, they made a successful trial planting of annual bromegrass and sweetclover. In the spring of 1969, they successfully established several woody plants, grasses, and legumes using a variety of fertilizer treatments. After the first growing season, they found that the best woody plants were 'Arnot' bristly locust, Japanese fleeceflower, fragrant sumac, indigobush, and European black alder. They rated the best herbaceous plants as weeping lovegrass, sericea lespedeza, and 'Kanlow' switchgrass.

In the spring of 1970, they made an additional planting at the base of a long slope. The waste material on the slope was sliding and endangering the railroad which ran below. They successfully established 'Arnot' bristly locust, staghorn sumac, smooth sumac, Russian olive, bladder senna, and Japanese fleeceflower.

As a result of the successful trial plantings, SCS personnel recommended to the Clinchfield Coal Company a seeding mixture for stabilizing the entire waste pile. The company seeded the area by

C. S. Pendleton, SCS district conservationist, now retired, measured the height of sumac in 1970, 2 months after planting. By 1977, the vegetation recommended by SCS had successfully stabilized the coal refuse pile.

helicopter in the spring of 1972. The planting was very successful and the slope was stabilized.

In the spring of 1977, some of the SCS specialists revisited the site of the plantings. All of the woody plants established in the 1969 planting were doing well. The European black alder was 18 to 20 feet high and looked vigorous. The fragrant sumac was about 5 feet tall and had produced an excellent seed crop. The indigobush was well established and several volunteer plants had grown on the face of the slope. The 'Arnot' bristly locust was spreading in all directions and the 'Amur' honeysuckle was making good growth and was in full bloom. However, the Japanese fleeceflower had suffered some damage from a late spring frost.

Of the grasses and legumes that were planted, 'Kanlow' switchgrass, 'Chemung' crownvetch, Kentucky 31 tall fescue, 'Lathco' flatpea, and 'Kaw' big bluestem had established the best. The crownvetch had spread to several areas in adjacent plots, but it was impossible to determine if it had spread from the original plot or from the 1972 seeding. The sericea lespedeza was growing, but for undetermined reasons the stand was declining.

The Russian olive from the 1970 planting was in full bloom and well established. The 'Arnot' bristly locust had spread several feet outside the plot area but had suffered damage from the late spring frost. Its leaves and some of its new growth were severely frozen. The sumacs had good survival and growth but were not contributing substantially to erosion control. There was, however, an excellent stand of tall fescue growing in all of the woody plots and there was 100 percent ground cover.

The Clinchfield Coal Company now uses a slightly modified version of the SCS seeding recommendations as standard practice in revegetating its waste piles.

Mr. Dronen is plant materials specialist, SCS, Raleigh, N.C.
Mr. Pendleton was district conservationist, SCS, Lebanon, Va., and is now retired.

Youth Camps for Conservation

by Frederick E. Bubb

More and more Pennsylvania youths have enrolled in conservation camps since the Nation's first county camp was opened there in 1956.

Thirty years ago, Pennsylvania State University and the Pennsylvania Federation of Sportsmen's Clubs initiated a statewide summer conservation camp program for young people. For the 40 high school students who attended the 1948 camp program, it was a new experience that combined conservation education and outdoor skills.

Through the years, the camp's popularity grew and with it the number of applications. So many students applied that it was impossible to accommodate all of them.

Sportsmen, parents, and conservationists throughout the State became concerned about the increasing number of students who had to be turned away from the State camp each year. One group, the Butler County Sportsmen's Council—an organization representing 15 affiliated clubs and more than 2,000 members—decided in 1956 to do something about educating Butler County youth in conservation. In July of that year, they opened the Nation's first county conservation camp.

Since the Butler County program began, about 600 young people between the ages of 15 and 17 have enjoyed the camp experience. Eleven other Pennsylvania counties now have camps, many organized with the help of Leonard Green of the Butler County Sportsmen's Council. So far, more than 2,000 students have been enrolled in the county camps and in the still popular State camp.

Campers receive instructions on many aspects of conservation, including how to improve and maintain water quality. Staff instructors are often supplied by SCS and local conservation districts.

The young people are usually sponsored by local businesses, civic clubs, or other community organizations. Camp leaders and instructors, many from conservation agencies and groups, are volunteers.

The local sportsmen's council and the local conservation district cooperate in developing the programs and managing the county camps. Many districts provide financial as well as staff support to their local conservation camp. State and Federal conservation agencies, including the Soil Conservation Service, provide camp staff and advice on conservation projects. The camps are held at facilities provided by the sportsmen's councils which also conduct some of the instructional programs.

"The primary goal of the camp program is to encourage youth to appreciate and understand the natural environment and life support systems," said Larry Smeltz, Monroe County Conservation Camp director. "There will be many beneficial side effects from the camp. Students will go back to their schools and start conservation clubs and many may seek careers in conservation."

Student participation is emphasized in camp programs. If the subject is stream ecology, the students

construct stream improvement devices, such as wing deflectors, and test the water for various types of pollution. In woodland studies, forest ecology, and wildlife programs, students participate in timber stand improvement and wildlife habitat management. Soils, land-use planning, and agriculture conservation practices are part of soil and water conservation studies.

In addition, there is a full range of outdoor skills and special interest activities, such as canoeing, archery, trapping, fly-tying, and mountaineering.

"Evening rap sessions are an important part of each camp. At the rap sessions, the students express their opinions about the camp, share experiences and impressions, and have questions answered," said Lowell Edminster, SCS district conservationist in Stroudsburg, Pa. "The sessions also give the camp staff a chance to do some problem evaluating in a relaxed and informal atmosphere."

The success of Pennsylvania's county conservation camps is demonstrated by the efforts the participants have put into local conservation activities after leaving camp. Many return to serve as junior camp counselors. More than 40 of the Butler County participants are now either studying conservation in college or making conservation their career.

Mr. Bubb is public information officer, SCS, Harrisburg, Pa.

Meetings:

June	
4–8	National Council of State Garden Clubs, Inc., Detroit, Mich.
4–9	General Federation of Women's Clubs, Phoenix, Ariz.
11–15	Outdoor Writers Association of America, Virginia Beach, Va.
19–27	Soil Science Congress, Edmonton, Alberta, Canada
24–29	National Environmental Health Association, Snowmass, Colo.
25–28	American Plywood Association, Portland, Oreg.
25–28	National Watershed Congress, Toronto, Ontario, Canada
25–29	American Seed Trade Association, Inc., Kansas City, Mo.
25–30	American Water Works Association, Atlantic City, N.J.
26–30	Air Pollution Control Association, Houston, Tex.
27–30	American Society of Agricultural Engineers, Logan, Utah
July	
8–12	National Association of Counties, Atlanta, Ga.
15–19	American Association of Nurserymen's Convention, New Orleans, La.
19–21	Izaak Walton League of America, Inc., French Lick, Ind.
23–27	National Federation of Business and Professional Women's Clubs, Inc., San Juan, Puerto Rico
30–Aug. 2	Soil Conservation Society of America, Denver, Colo.
August	
6–9	American Agricultural Economics Association, Blacksburg, Va.
13–16	National Farm & Power Equipment Dealers Association, Calgary, Alberta, Canada
13–17	Conservation Education Association, Logan, Utah
13–17	National Association of County Agricultural Agents, Boise, Idaho
14–18	First International Rangeland Congress, Denver, Colo.
20–25	Natural Resource Council, Athens, Ga.
21–25	American Fisheries Society, Kingston, R.I.

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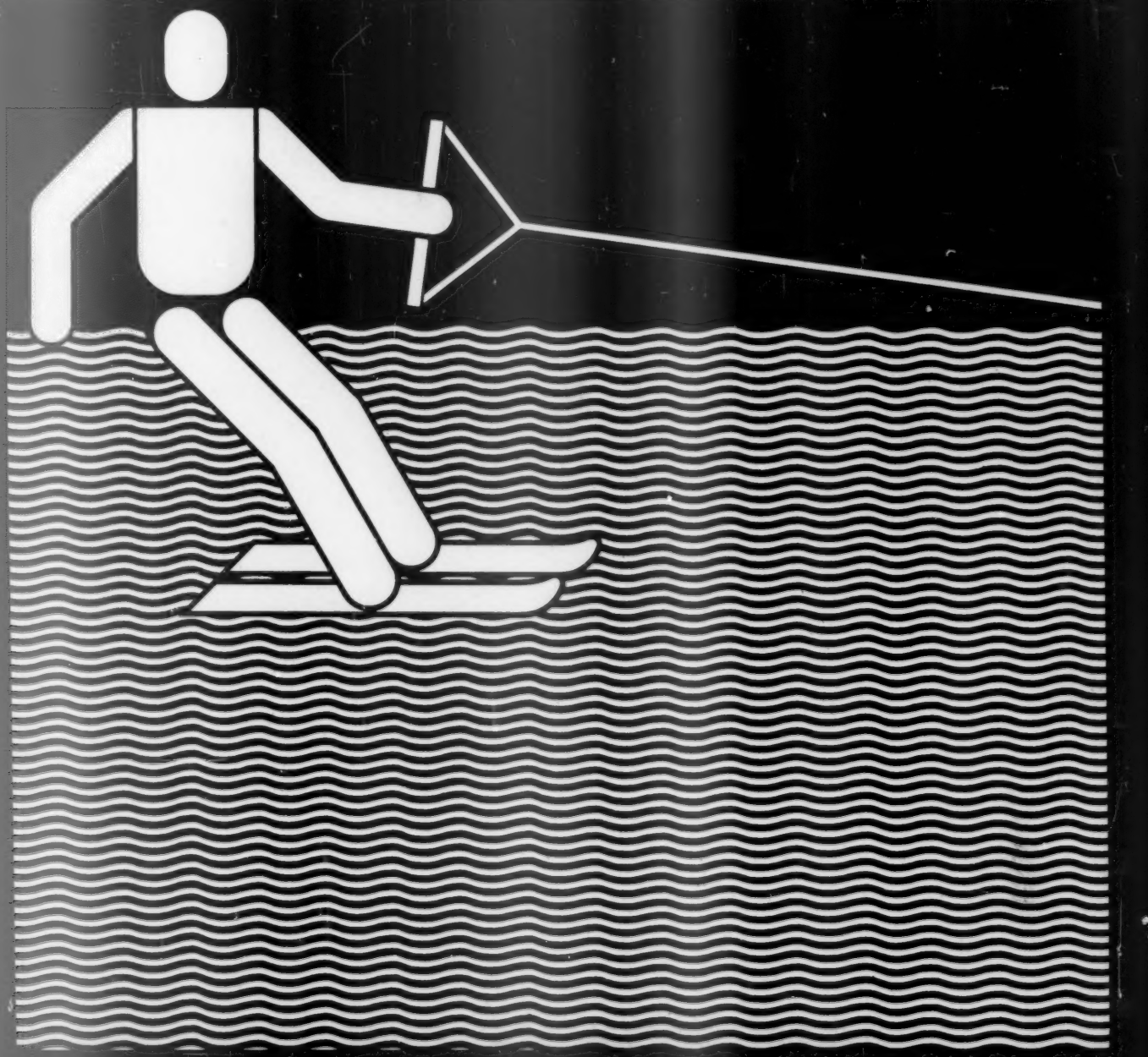
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